

Species Diversity of the Genus *Gigaspora* in Indian Thar Desert

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The objective of the present study was to investigate species diversity of the arbuscular mycorrhizal genus *Gigaspora* associated with some important plants of Indian Thar Desert. *Gigaspora* species are an important component of soil microorganisms and are beneficial for plant growth and development. Identification and characterization were made on observed spore morphology. Five species of *Gigaspora* have been reported. The most frequent and abundant species was found to be *G. margarita*.

Key words: *Gigaspora*, Species diversity, Indian Thar Desert.

Indian Thar desert comprises sandy soil with low water retention capacity, low moisture, lacking nutrients, low nutrient holding capacity, high temperature, variable pH and lesser rhizosphere microorganisms. All these characters make soil to be supplemented with extra vigor and nutrients. Arbuscular Mycorrhiza (AM) is a well symbiotic fungal group established with plants growing in this region, providing nutrients, especially phosphorus to plants growing under nutrient deprived conditions. AM fungi not only aid in nutrient uptake, but act as a regulator of growth of plants under these extreme conditions. AM fungi include 18 genera namely *Glomus*, *Funnelformis*, *Rhizophagus*, *Sclerocystis*, *Claroideoglomus*, *Redeckera*, *Diversispora*, *Otospora*, *Acaulospora*, *Entrophospora*,

Gigaspora, *Scutellospora*, *Racocetra*, *Pacispora*, *Geosiphon*, *Ambispora*, *Archeospora* and *Paraglomus*¹.

The present widespread interest in AM fungi makes it extremely important to describe the characters of the individual fungal species or isolate precisely. There scattered information available in the literature as far as total number of species, characteristic feature and microphotographs of different species of the genus *Gigaspora* concerned to Indian Thar Desert while it is an important biotic component. *Gigaspora* has been largely neglected in any of the biodiversity studies of a given area. Hence the purpose of present study is to enlist and characterized *Gigaspora* species associated with rhizosphere soils of important Indian Thar Desert plants.

The genus *Gigaspora* Gerdemann & Trappe belongs to the family Gigasporaceae; order Diversisporales; class Glomeromycetes; phylum Glomeromycota². The genus *Gigaspora* characterized by large spores (Gr. giga (big)+ spora = large spore), globose to subglobose, but often

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ovoid, obovoid, pyriform, in shape, borne on a bulbous suspensor attached to subtending hyphae, with multilayer wall, without the formation of germination shield during germination. Species of *Gigaspora* are generally distinguished and

characterized with their specific feature of spore i.e. shape, size, colour, wall structures suspensor, subtending hyphae, mode of germination etc. By using these parameters, five isolates were isolated during the present course of investigation on the

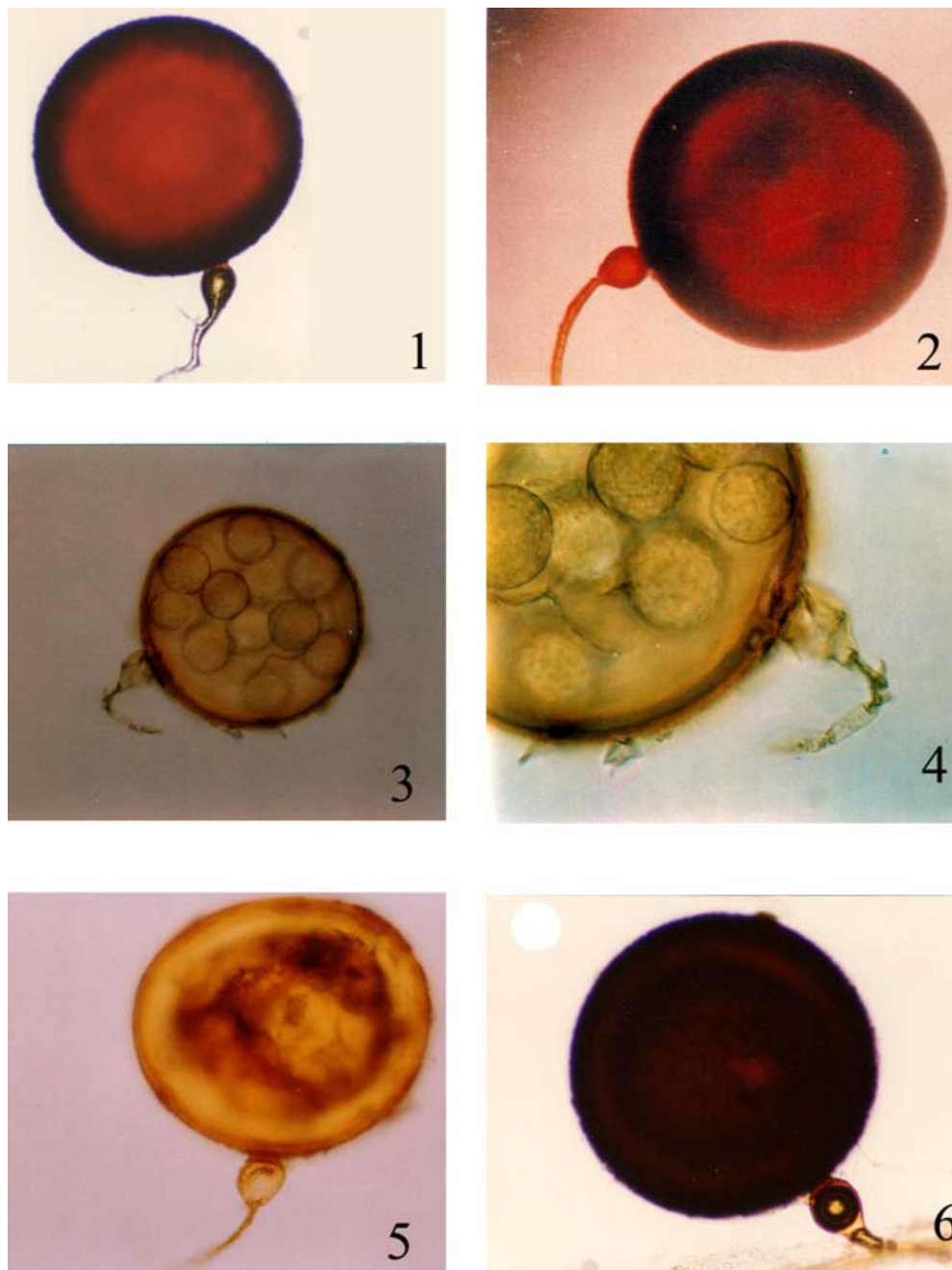


Fig. 1. *Gigaspora* species isolated from rhizosphere soil of plants growing in Indian Thar Desert. 1 - *Gigaspora rosea* Nicol & Sclenck (40x), 2 - *Gigaspora gigantea* (Nicol. & Gerd.) Gerd. & Trappe (40x), 3 - *Gigaspora margarita* Becker & Hall (40x), 4 - Magnified view of *Gigaspora margarita* Becker & Hall (100x), 5 - *Gigaspora albida* (Schenck & Smith) (40x), 6 - *Gigaspora* sp. (40x). Scale bar represents 20 μ m

diversity assessment of *Gigaspora* in Indian Thar Desert. All isolates were identified at species level by using of synoptic key and manuals³⁻⁵.

Descriptions of individual species thus isolated are discussed here.

***Gigaspora rosea* Nicol & Sclenck**

Azygospore produced singly in soil. Predominantly globose, 230–300 µm in diameter, rose pink in colour. Spore wall structure of three walls in one group. Suspensor like cell attachment to azygospore usually spherical to bulbous in shape. Subtending hyphae long and hyaline (Fig. 1).

***Gigaspora gigantea* (Nicol. & Gerd.) Gerd. & Trappe**

Azygospores formed singly in soil. 355–400 µm globose to subglobose, reddish brown to brown, with a thin outer wall tightly covering an inner wall. Suspensor like cells bulbous extending from the base of the spore. Subtending hyphae long, coenocytic, slender, thick, light brown in colour (Fig. 2).

***Gigaspora margarita* Becker & Hall**

Azygospore formed singly in the soil, globose spores, 260–480 µm diameters. Spore wall smooth and thick, spore contents many oil droplets. Suspensor broad, hyaline to light brown. Subtending hyphae generally septate below the suspensor (Fig. 3 & 4).

***Gigaspora albida* (Schenck & Smith)**

Azygospore formed singly in the soil, dull yellow to yellowish brown, 300–450 µm in size. Spore walls smooth, divided into outer, middle and inner wall. Azygospore attached to a single, hyaline to yellow bulbous suspensor attached to septate hyphae (Fig. 5).

***Gigaspora* sp.**

Azygospores formed singly in the soil, dark brown to black, spherical or globose, 250–500 µm in diameter outer wall black to dark brown. Inner wall light brown. Suspensor bulbous shape subtending hypha septate below the suspensor cell (Fig. 6).

DISCUSSION

In this work we determined different *Gigaspora* species associated with the various plants of the arid area, Indian Thar desert. AMF association is the essential requirement for the survival and validation in these adverse conditions. The AMF, *Gigaspora* species are the

predominant organisms in saline-sodic soils of agricultural interest⁶. *Gigaspora* species are an important component of the soil with AMF, in all the types of environments and are beneficial for plant growth and development by increasing the nutrient uptake. These species are also important to contribute substantially to the governance, productivity and longevity of natural and man-made ecosystem.

CONCLUSION

Gigaspora species are an important component of the soil in all the types of environments and are beneficial for plant growth and development by increasing the nutrient uptake. These species are also important to contribute substantially, productivity and longevity of plants in adverse condition of Thar Desert

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